Volunteer Lake Assessment Program Individual Lake Reports
KEZAR LAKE, SUTTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	6,848	Max. Depth (m):	8.2	Flushing Rate (yr¹)	8.2
Surface Area (Ac.):	182	Mean Depth (m):	2.7	P Retention Coef:	0.46
Shore Length (m):	3,400	Volume (m³):	1,975,500	Elevation (ft):	906

TROPHIC CLASSIFICATION

Year	Trophic class
1984	MESOTROPHIC
2003	MESOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Good	There are at least 10 samples with one, but < 10% of samples, exceeding criteria.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

KEZAR LAKE - WADLEIGH STATE PARK BEACH	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
KEZAR LAKE - WADLEIGH STATE PARK BEACH	Cyanobacteria	Slightly Bad	Cyanobacteria bloom(s).

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.
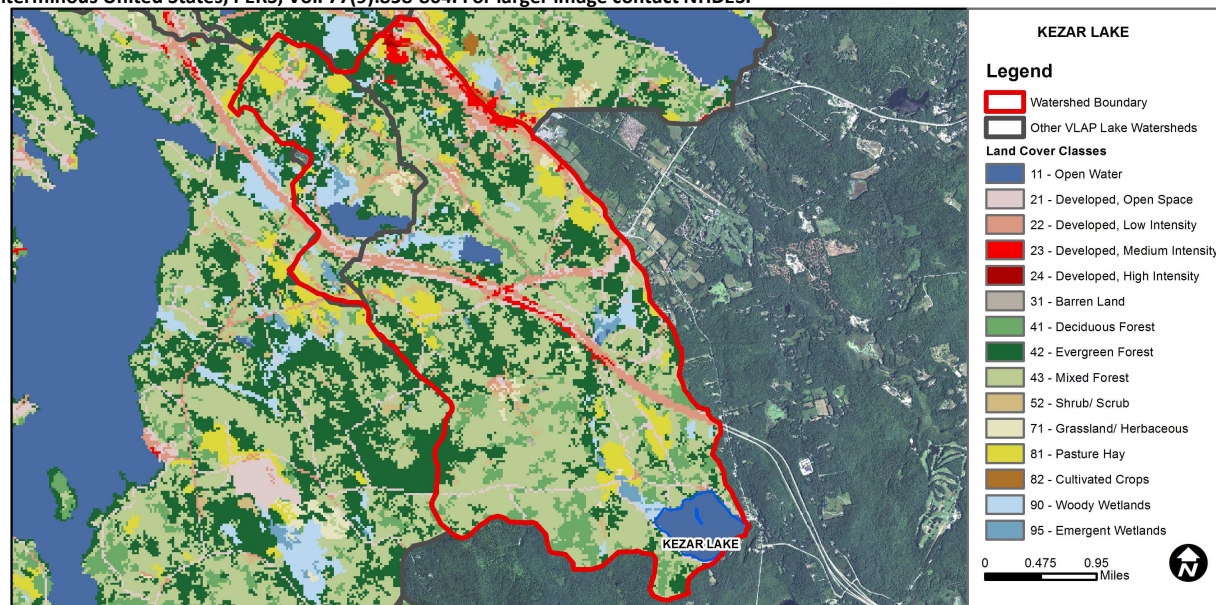
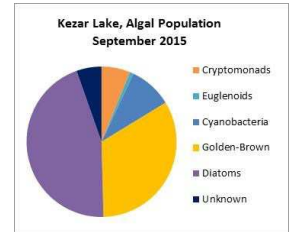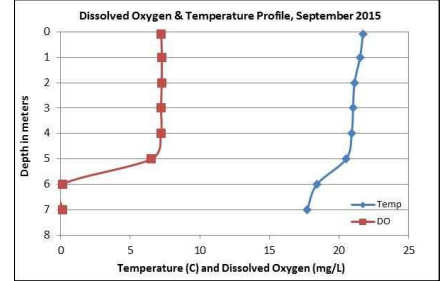| Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	4.46	Barren Land	0.14	Grassland/Herbaceous	0.73
Developed-Open Space	5.86	Deciduous Forest	8.25	Pasture Hay	6.39
Developed-Low Intensity	6.24	Evergreen Forest	22.37	Cultivated Crops	0.07
Developed-Medium Intensity	1.39	Mixed Forest	36.49	Woody Wetlands	3.22
Developed-High Intensity	0.07	Shrub-Scrub	3.27	Emergent Wetlands	1.11

RECOMMENDED ACTIONS: The improving chlorophyll trend is a positive sign, however phosphorus and transparency have become more variable since 2006. The increased frequency and intensity of storm events and resulting stormwater runoff could be transporting suspended sediments and/or other pollutants to the lake, as well as flushing highly colored wetlands systems rich in organic acids and carbon. These could be contributing to reduced water clarity and worsening epilimnetic pH levels. We recommend analyzing epilimnion samples for Apparent Color to determine if the water color has become darker over time or during years with above average rainfall. This can be analyzed free of charge at the NHDES Jody Connor Limnology Center. The worsening epilimnetic conductivity trend is likely the result of winter de-icing products applied to roads, parking lots, driveways and walkways. Educate and encourage local road agents to obtain a NH Voluntary Salt Applicator license through UNH Technology Transfer Center's Green SnowPro Certification program. Keep up the great work!

OBSERVATIONS (*Refer to Table 1 and Historical Deep Spot Data Graphics*)

◆ **CHLOROPHYLL-A:** Chlorophyll levels were average in June and August and then decreased to low levels in September. The 2015 average chlorophyll level decreased from 2014 and was less than the state median. Historical trend analysis indicates significantly decreasing (improving) chlorophyll levels since monitoring began. We hope to see this continue!

◆ **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), hypolimnetic (lower water layer), Inlet, and Outlet conductivity and chloride levels were slightly elevated and much greater than the state medians. Historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity since monitoring began. Lyon Bk. at Trussel Ridge conductivity and chloride levels were greatly elevated and this station is likely impacted by I-89 upstream as well as local roads.

◆ **TOTAL PHOSPHORUS:** Epilimnetic phosphorus was low in June, increased slightly in August and then decreased in September. Average epilimnetic phosphorus remained stable from 2014 and was less than the state median. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years. Hypolimnetic phosphorus was elevated in June due to bottom sediment contamination. Phosphorus decreased to average levels in August and September. Inlet, Lyon Bk. at Trussel Ridge and Outlet phosphorus levels were relatively stable from June through September and within average ranges for those stations.

◆ **TRANSPARENCY:** Transparency was low (worse) in June and then increased (improved) to slightly above average levels in August and September. Average transparency decreased slightly from 2014 and was slightly less than the state median, however was above average (good) for the lake. Historical trend analysis indicates highly variable transparency since monitoring began. Transparency measured with the viewscope (VS) was generally much better than that measured without (NVS) and is likely a better representation of actual conditions.

◆ **TURBIDITY:** Epilimnetic turbidity was slightly above average for that station but remained stable from June through September. Hypolimnetic turbidity was elevated in June due to bottom sediment contamination and then decreased to average levels in August and September. Inlet and Lyon Bk. at Trussel Ridge turbidities were within average ranges for those stations. Outlet turbidity was slightly elevated in June and a recent storm event combined with low flow conditions likely led to sediment and organic material accumulating at the Outlet.

◆ **PH:** Epilimnetic and Hypolimnetic pH fluctuated below the desirable range 6.5-8.0 units however average pH levels were approximately equal to 6.5. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began. Inlet pH levels were low due to an extensive wetland system and Lyon Bk. at Trussel Ridge and Outlet pH levels were within the desirable range.

Dissolved Oxygen & Temperature Profile, September 2015

Kezar Lake, Algal Population September 2015

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

Chloride: > 230 mg/L (chronic)

E. coli: > 88 cts/100 mL – public beach

E. coli: > 406 cts/100 mL – surface waters

Turbidity: > 10 NTU above natural level

pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.

Alkalinity: 4.9 mg/L

Chlorophyll-a: 4.58 mg/m^3

Conductivity: 40.0 uS/cm

Chloride: 4 mg/L

Total Phosphorus: 12 ug/L

Transparency: 3.2 m

pH: 6.6

Station Name	Table 1. 2015 Average Water Quality Data for KEZAR LAKE								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	9.1	2.85	41	177.2	10	2.85	3.53	1.25	6.52
Hypolimnion				179.1	23			4.84	6.55
Inlet			63	246.2	23			1.83	6.30
Lyon Brook at Trussel Ridge			120	448.0	15			1.04	6.83
Outlet			42	175.4	9			1.14	6.96

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Improving	Data significantly decreasing.
pH (epilimnion)	Worsening	Data significantly decreasing.	Transparency	Stable	Trend not significant; data highly variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.

Historical Trend Epilimnetic Conductivity and pH

Historical Deep Spot Chlorophyll-a, Epilimnetic Total Phosphorus & Transparency Data